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National Legislations on Air Quality Protection and Penalties for Atmospheric Air Pollution in Central Asia

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Abstract

Air pollution poses severe risks to public health and the environment, with acts contributing to air contamination potentially constituting environmental crimes or public health offenses. This research examines the national legislations and international legal frameworks aimed at safeguarding atmospheric air quality and addressing air pollution-related offenses in Central Asian countries. Particular attention is given to legal provisions that establish emission standards, monitoring mechanisms, and punitive measures for violations. By exploring the genesis and implementation of these legal instruments, the research identifies potential gaps, inconsistencies, or weaknesses that may hinder the effective prosecution of environmental crimes associated with air pollution in the Central Asian region. This study contributes to the broader understanding of environmental criminology by examining the interplay between international norms, national legislations, and institutional structures in combating air pollution-related offenses.

Keywords: ecological problems; environmental safety; environmental criminology; legal norms; global urbanization.

Introduction

The World Health Organization (WHO) has revealed that pollution of a crucial element of the natural habitat is a critical determinant that can negatively affect human health. The presence in the Earth's atmosphere of fine PM2.5 particles, including ammonium nitrates and sulphates, occurs due to emissions of non-methane organic compounds (NMVOC), nitrogen oxides, ammonia sulphur (NO_x, SO_2, NH_3). These elements hazardous to human health can cause premature mortality and cardiovascular diseases (Actions on air quality…, 2021). To

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overcome these negative consequences, significant investments are required in both environmental safety and public health. If it is about the financial assessment of such investments, then they amount to approximately 5.1 trillion dollars, which is more than 6.5% of the world economy. Since 2010, there has been a significant deterioration in air quality on planet Earth. The World Bank estimates the economic damage associated with air pollution in Europe and Asia at 5.1% of GDP (What's in the air…, 2020). The Organization for Economic Co-operation and Development (OECD) is more categorical in its estimates, noting that global economic losses from problems associated with the occurrence of diseases and deaths, which are determined by fine particulate matter (PM) and ground-level ozone (O_3) air pollution are estimated at 1.7 trillion USD per year, which is 3.5% of global GDP (Astrom and Pignatelli, 2019).

The economic costs associated with air pollution underscore its significance as a criminological issue. In addition to direct health effects, pollution-related illness and premature death have significant economic consequences (Saktaganova et al., 2019). The global costs, estimated in the trillions of dollars, associated with air pollution include not only health costs, but also the broader economic consequences associated with reduced productivity and lower quality of life. From a criminological perspective, understanding economic impacts can provide valuable information for developing policies to prevent and mitigate air pollution. Such policies should view air pollution as a harm to society that requires intervention and control.

The goal of this investigation is to examine the present conditions surrounding atmospheric air defence in Central Asian countries, and the challenges associated with implementing international legal standards designed to safeguard the Earth's atmosphere, the impact of the latter on the national legislation of the states of the Central Asian region, as well as providing recommendations to improve these norms (Janel, 2018). It should be noted that a modern study of the problems of providing clean air in the states of Central Asia was carried out by S. Astrom et al. (2021). This study offers an examination of issues related to air contamination, specifically from sulphur dioxide, nitrogen oxide, non-methane volatile organic compounds, ammonia, and fine particulate matter in Central Asian countries between 2016 and 2020. J. Munthe et al. (2019) carried out a detailed analysis on global emissions of such a hazardous chemical as mercury. Z.B. Umbetbayeva (2020) conducted a comprehensive examination of the measures ensuring legal air protection in Kazakhstan. She suggested various amendments to regulatory documents, such as introducing a new version of the Environmental Code of the Republic of Kazakhstan (2021). If that wasn't feasible, she advised the adoption of a distinct regulatory statute.

G.Z. Toktibayeva et al. (2020) studied the key sources of air pollution in Kazakhstan, namely stationary sources (industrial and fuel and energy enterprises) and identified key challenges in the field of public health. D.U. Kenessary et al. (2019) published the findings from an examination of the condition of air in 26 regions of Kazakhstan, where there is a risk of negative impact of public health consequences of short-term contact with particulate matter, oxides and dioxides of nitrogen and sulphur. Despite the wide scientific elaboration of certain problems of ensuring the protection of the atmosphere in the Central Asian region, it's worth mentioning that the population of the Central Asian states is poorly informed about the problems associated with air pollution (Ayanbayev et al., 2015).

According to United Nations Development Program (UNDP), Kyrgyzstan was listed among the cities with the poorest air quality among the states of Central Asia, especially during the winter periods from 2019 to 2021 (UNDP – Kyrgyzstan, 2023). Nevertheless, in such cities as Almaty (Kazakhstan) and Bishkek (Kyrgyzstan), the situation is gradually normalizing due to an integrated approach to informing the population by representatives of authorities, local governments and public organizations, which allows achieving positive results in the field of ensuring environmental safety of nature and population. In this aspect, the experience of the city of Almaty should be recognized as effective, in which a network of monitors of appropriate certification installed at the initiative of the local population operates. This network allows you to monitor air quality. Note that Kazakhstan regularly monitors air quality using the "AirKz" application, which analyses data in real time (Astrom et al., 2021).

In the republics of Central Asia, in particular Kazakhstan, Kyrgyzstan and Uzbekistan, close international cooperation and mutual assistance is carried out under the United Nations Environment Program (UNEP), UNDP, The World Bank in order to ensure clean air. Of particular importance are such international projects as:

– the automation of air pollution monitoring in Uzbekistan, facilitated by UNEP support. This initiative, thanks to the "AirUz" application, demonstrates air quality monitoring data, and also provides practical recommendations for citizens in the field of ensuring clean air;

– assessment of the degree of air pollution and its impact on the population of Kyrgyzstan, carried out backed by UNEP and UNDP. The initiative is aimed at establishing the sources of air pollution, the degree of influence of this pollution on human health;

– strengthening air quality management in Kyrgyzstan and Kazakhstan backed by the US State Department, UNEP and UNDP.

These projects are designed to expand the interaction of the states of Central Asia in the field of ensuring clean air, as well as to ensure effective international cooperation in the direction of ensuring clean air in the Central Asian region.

Materials and Methods

In the process of researching the problems of legal safeguarding of air in the statutes of Central Asian countries and under international law. The authors consistently analysed the key provisions of international legal agreements and the norms of national legislation in the realm of safeguarding atmospheric air quality of the member states of the Central Asian region. This made it possible to determine the problem of legislative protection and protection of air in the states of Central Asia and international law, to identify the goals and aims of the study. An empirical study of the problems of ensuring cleanliness and air quality in the states of Central Asia testifies to the effectiveness of the measures implemented by the world community to control air purity during different epochs of societal evolution.

The general scientific methods of formal logic, generalization, abstraction, analysis and synthesis, induction and deduction, analogy, modelling are of particular importance in the scientific knowledge of issues related to the legal safeguards for the quality of atmospheric air in the legislation of the Central Asian states and international law. Thus, the systematic analysis technique was utilized in the process of studying the category "atmospheric air". This method made it possible to comprehensively consider the features of the national legislations of Central Asian countries regarding air quality preservation in conjunction with the international legal regulation of this issue, which constitutes a system for ensuring international environmental security.

In the course of studying the problems of ensuring clean air in the legislation of the Central Asian states and international law, general and special scientific methods were used, namely: statistical analysis, comparative legal, system-structural, logical, formal-legal methods of cognition. The comparative legal method made it possible to consider the features of ensuring measures to adhere to air quality standards as per the national laws of the Central Asian countries and international law. In the process of applying the historical method of knowledge, patterns and trends were identified in the process of overcoming the problems of air pollution, which made it possible to assess the effectiveness of the existing legal regulation and determine the prospects for subsequent academic investigation.

Results and Discussion

Air pollution trends and legislative framework in Central Asia

The establishment of the legal regime for air protection in the states of Central Asia is a historically complex and lengthy process (Apte et al., 2012). Recent decades have seen a notable increase in air temperature in Central Asia, yet there has been minimal variation in average precipitation. Nonetheless, climatic patterns can diverge considerably across distinct sub-regions, altitudes and seasons, due in part to the level of pollution (Haag et al., 2019). Among the Central Asian states, emissions of contaminants are highest in Kazakhstan – this applies to all pollutants except for ammonia (Figure 1).

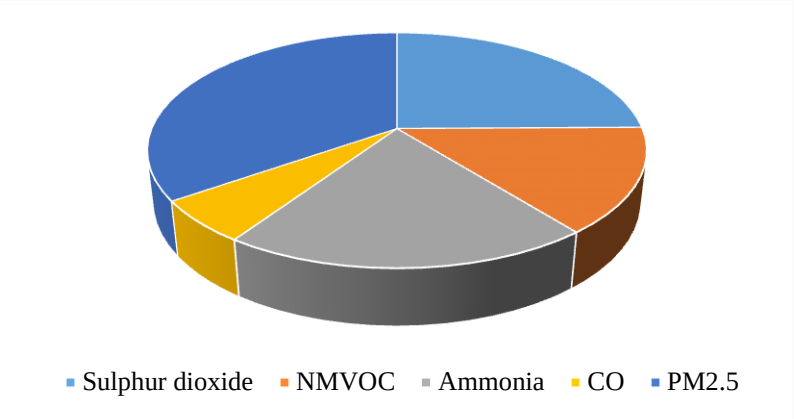

Figure 1. Share of air pollution in Central Asian countries in 2022

It should be noted that 80-90% of sulphur dioxide emissions in the Central Asian region are in Kazakhstan, and ammonia emissions in the region have increased by more than 19%. Trends in NMVOC and CO show emission reductions of 7% and 12% in the Central Asian states. Accordingly, emissions of all substances except SO_2 are increasing in the region. NO_x emissions – decreased by 13%. $PM_{2.5}$ emissions increased by 46% (Astrom et al., 2021). Cities consistently exhibit a heightened level of air pollution, such as Astana, Karaganda, Zhezkazgan, Almaty, Ust-Kamenogorsk, Temirtau, Balkhash. It should be noted that in Astana the main pollutants are particulate matter (dust), particulate matter $PM_{-2.5}$, particulate matter PM_{-10}, sulphur dioxide, carbon monoxide, nitrogen dioxide, nitrogen oxide, ozone, hydrogen sulphide, hydrogen fluoride. So, in Astana, the concentration of hydrogen sulphide exceeds the norm from 10.5 to 12.9. In Karaganda, such substances are carbon monoxide, nitrogen oxide and dioxide, ozone, hydrogen sulphide. For example, in Karaganda, the ratio of the proportion of suspended particles ($PM_{-2.5}$) is from 12.8 to 18.4. The amount of

suspended particles of PM_{-10} in the same city ranges from 1.8535 to 4.9142 mg/m3 (Information bulletin on the state…, 2022; Grebeneva et al., 2018) (Figure 2).

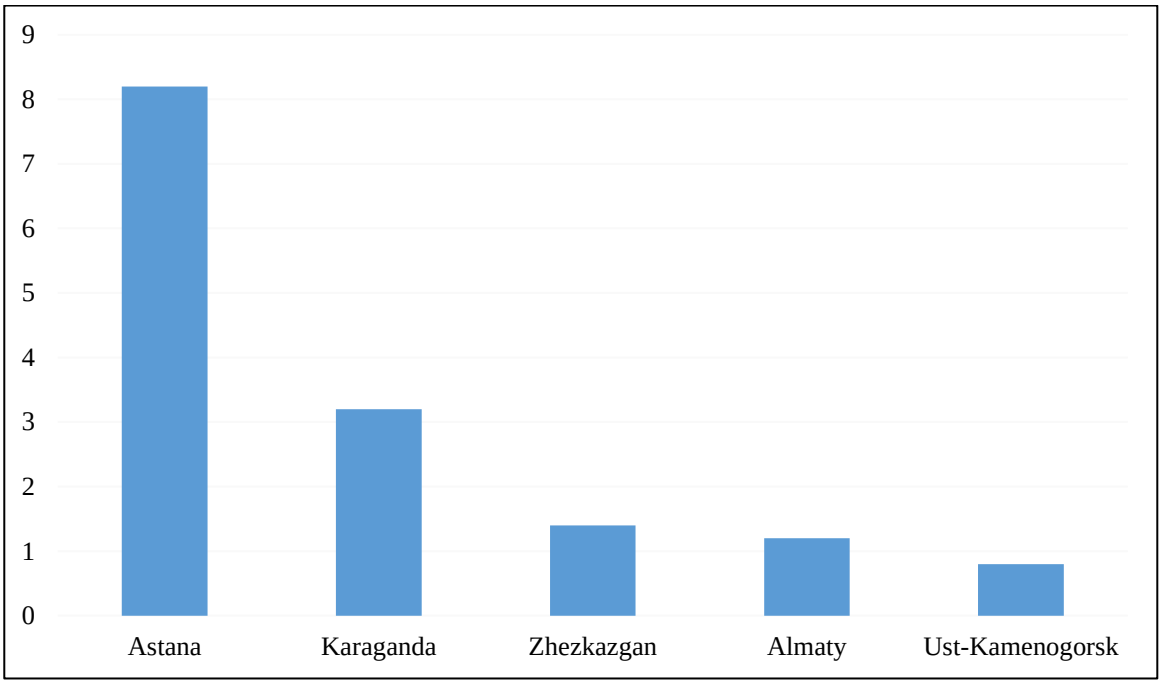

Figure 2. The share of air pollution in the cities of Kazakhstan for 2018-2022

Note: Astana – hydrogen sulphide concentrations from 0.0839 to 0.1035 mg/m^3; Karaganda – the proportion of suspended particles ($PM_{-2.5}$) from 2.0407 to 4.9442 mg/m^3; Zhezkazgan – proportion of suspended particles ($PM_{-2.5}$) up to 2000 mg/m^3; Almaty – share of suspended particles ($PM_{-2.5}$) up to 3000 mg/m^3; Ust-Kamenogorsk – proportion of suspended particles ($PM_{-2.5}$) up to 1000 mg/m^3.

In international law, "atmospheric air" means the air surrounding the troposphere, excluding work areas to which workplace health and safety standards that are enforced, and which the general public doesn't consistently access (Directive 2008/50/EC…, 2008), where "work areas" are places in buildings or structures belonging to the enterprise and / or production intended for use as workplaces, which encompass any location within the company's premises that the employee can access while executing their designated tasks (Council Directive 89/654/EEC…, 1989).

Art. 1 Law of the Republic of Uzbekistan "On atmospheric air protection" (1992) provides that atmospheric air is a fundamental component of natural resources, is a national wealth and is protected by the state. At the same time, Law of the Kyrgyz Republic No. 51 "On the protection of atmospheric air" (1999)

clearly establishes the concept of atmospheric air, which is interpreted as the gaseous envelope of the Earth, consisting of a mixture of various gases, water vapour and dust. Also, Art. 1 Law of Turkmenistan No. 182-I "On the protection of atmospheric air" (1996) found that atmospheric air is an element of the natural environment, comprising a natural blend of atmospheric gases. It's acknowledged that preserving this air quality entails collaborative efforts from state agencies, local governance, community organizations, various legal entities, and individuals. Their combined goal is to enhance air quality to mitigate its adverse effects on public health and the environment.

In turn, Art. 1 Law of the Republic of Tajikistan No. 915 "On the protection of atmospheric air" (2012) defines atmospheric air as a gaseous envelope surrounding the Earth and consisting mainly of nitrogen, oxygen, mixtures of inert gases, carbon dioxide, ozone and other gases. Atmospheric air protection is envisaged as an activity of state bodies, public organizations, citizens and business entities focused on preserving and rejuvenating atmospheric air quality by diminishing or averting air pollution. The most accurate, according to the authors, definition of the concept of "atmospheric air" is presented in Art. 198 Environmental Code of the Republic of Kazakhstan (2021), which stipulates that atmospheric air, a fundamental constituent of the natural milieu, comprises a combination of atmospheric gases present external to residential, industrial, and additional edifices. Atmospheric air is the subject to protection from pollution.

The entitlement to pure, superior-quality air forms an integral part of the right to a secure natural environment. Such a right is intrinsically linked with the state's duty to guarantee adequate safeguarding of the atmospheric air. Indeed, on the one hand, air pollution occurs precisely by people, and on the other hand, the state has the obligation to limit in a certain way the activities of people in air pollution. According to paragraph "A" Art. 1 Convention on Long-Range Transboundary Air Pollution (1979), the main source of harmful effects on atmospheric air is human activity. It is as a result of its implementation that waste is generated, from which gaseous substances enter the atmospheric air, polluting and affecting it (Nurmagambetova, 2022; Chigarkin, 2006).

Air pollution is a type of environmental damage that can have significant consequences for human health, natural systems and the general well-being of society (Shevchuk et al., 2022; Nikolaychuk, 2023). From a criminological perspective, the uneven emission of pollutants in certain areas, such as Kazakhstan, can be seen as a manifestation of environmental inequality, where marginalized communities experience most of the harmful effects and often lack the means to control or mitigate pollution. Furthermore, the lack of sufficient regulation and control of air pollution can be interpreted as a manifestation of

regulatory inefficiency, where the State's inability or unwillingness to enforce environmental laws perpetuates harmful effects and undermines public trust in governance. It is necessary to understand the criminological aspects of air pollution in Central Asia in order to develop effective approaches to mitigate environmental damage and ensure environmental justice.

Legal protection of the environment at the national level inevitably implies international cooperation, because the solution of problems within the country only by national efforts is beyond the power even for the developed countries of the world (Report from the Commission to…, 2021). For this, a number of relevant organizations have been created, such as the UNESCO and the Global Environment Facility (GEF). However, not all states are members of such organizations, including the countries of Central Asia, in particular, because of the need to fulfil the requirements for membership in organizations. Air protection involves a complex process of organization and interaction between public authorities, public institutions, and international organizations in ensuring air quality and purity (Yamineva and Romppanen, 2017). Air pollution is a global environmental and economic problem that negatively affects people's life expectancy. Air pollution contributes to a rise in the prevalence of diseases amongst the global population on a per capita basis. Note that the peak period of uncontrolled air pollution was recorded in 1970-1980 (Astrom et al., 2021). It was during this period that the imperative of international collaboration to overcome air pollution was proclaimed.

Integration of international legal norms in the field of atmospheric air protection

International jurisprudence has established several legal instruments aimed at reducing or eradicating the adverse impacts of air pollution across diverse global regions. These international legal mechanisms are being implemented and modernized to varying degrees, with the support of the world community, in the states of Central Asia to guarantee the well-being and safety of people and the effective development of this region. Since gaining independence, a new stage in the control over the safety of natural resources has begun for the countries of Central Asia. These countries have actively incorporated into international cooperation, which allowed the latter to become parties to many international legal agreements aimed at ensuring air safety.

It should be noted that this incorporation is carried out by means of reforming and modernizing the national legislations of Central Asia. Thus, Tajikistan adopted a number of special laws for this purpose, in particular:

– The 2011 Law No. 1449 of the Republic of Tajikistan, titled "On environmental protection", establishes the legal foundation for policies related to environmental conservation and mitigating adverse human impacts on the environment.

– The 2012 Law No. 915 of the Republic of Tajikistan, named "On the protection of atmospheric air", delineates the criteria for air protection from both stationary and mobile sources, during fuel and waste combustion, under adverse meteorological circumstances, and from detrimental physical atmospheric effects.

– The Law No. 707 of the Republic of Tajikistan pertains to "On environmental monitoring" (2011), defines the objects, subjects of monitoring and introduces the procedure for its implementation, determines the introduction of the State Register of Environmental Monitoring Objects of Tajikistan.

It should be noted that in Tajikistan there is a fee for environmental contamination and waste management, and permitting measures for emissions into the atmosphere have been introduced (Reviews of environmental performance – Tajikistan, 2017). Accordingly, there are a number of legal provisions in Tajikistan that protect the safety of atmospheric air, but there are no mechanisms for controlling anthropogenic greenhouse gas emissions, which requires further international cooperation and reform of the current legislation.

Uzbekistan guarantees citizens the right to atmospheric air favourable for life and health, obtaining reliable and timely information about the state of atmospheric air and measures taken to protect it, compensation for damage in case of harm resulting from the release of contaminants into the atmosphere. Since 2019, Uzbekistan has carried out intensive reforms of legislation and strategic framework for the protection of atmospheric air. Thus, several long-term strategic documents were adopted, such as the 2019 Decree No. UP-586 issued by the President of the Republic of Uzbekistan titled "On approval of the Concept of Protection of the Environment of the Republic of Uzbekistan until 2030", alongside the 2019 Decree No. PP-4477 titled "On approval of the Strategy for the Transition of the Republic of Uzbekistan to a 'green' economy for the period 2019-2030". A number of new draft laws are currently being prepared and the country is about to start developing an Environmental Code (Reviews of environmental performance – Tajikistan, 2017). It should be noted that the following laws are in force in Uzbekistan in the field of air protection:

– Law No. 754-XII "On nature protection" (1992);

– Law "On atmospheric air protection" (1992).

Turkmenistan has an environmental policy formulated in the "National Program for the Socio-Economic Development of Turkmenistan for the period 2011-2030", and the following laws apply in the field of air protection:

– Law of Republic of Turkmenistan No. 40-V "On nature protection" (2014);

– Law of the Republic of Turkmenistan No. 569-V "On environmental safety" (2017);

– Law of the Republic of Turkmenistan No. 53-IV "On Ozone Layer protection" (2009);

– Law of Turkmenistan No. 182-I "On the protection of atmospheric air" (1996).

As per the fundamental clauses of legislation concerning atmospheric air protection, it's mandated that detrimental human-made influences on the climate system are prohibited. The cornerstone principles of such legislation encompass the diminution and regulation of noxious emissions, addressing atmospheric protection issues underpinned by scientific research, and the adoption and utilisation of energy-efficient and resource-conserving technologies (Sharyi, 2023). Turkmenistan assures its citizens the right to access accurate and prompt information about the atmospheric air's condition and its pollution sources. Should there be any breaches, compensation is ensured.

The implementation of international legal requirements for the protection of atmospheric air into national legislation presents significant obstacles for Central Asian countries, raising serious questions. These challenges point to possible shortcomings, contradictions or vulnerabilities in the legal framework that may hinder the successful prosecution of environmental crimes related to air pollution. Understanding these deficiencies is critical to assessing the effectiveness of legal systems in combating and preventing environmental crimes. Environmental crimes are potentially committed when emission reduction methods are not followed or when emission standards are intentionally violated. This emphasizes the importance of applying legal mechanisms to hold accountable those who pose a threat to air quality and public health by failing to comply with or intentionally violating regulations (Kidalov and Snizhna, 2021).

The varying degrees of participation and endorsement of global agreements and regulations by Central Asian countries provide useful insights into the regional environmental governance system. It is very important to identify countries that do not have sufficient legal support or enforcement mechanisms to deal with environmental crimes related to air pollution. This is necessary in order to focus capacity-building initiatives and facilitate international cooperation to address environmental problems that cross national boundaries. Analyzing the institutional frameworks and surveillance systems implemented in some Central Asian countries to regulate air quality and monitor emissions is important from a criminological perspective. These systems perform a critical function in

identifying and collecting evidence for prosecution of environmental crimes related to air pollution, and also assist in the enforcement of legal obligations. Understanding the effectiveness and limitations of these institutional arrangements can provide valuable information for developing approaches to improve enforcement and accountability in environmental governance.

Kazakhstan has embraced several documents that delineate its long-term progression, including the "Strategy 'Kazakhstan-2050'" (as per the 2012 presidential address), the concept guiding the nation's shift towards a "green economy" (as expounded in the 2013 decree commentary), the strategic blueprint for Kazakhstan's growth up to 2025 (laid out in the 2018 presidential decree), and the 2021 Environmental Code of the Republic of Kazakhstan. As per Kazakhstan's legislative framework, pollution sources are identified as those of both anthropogenic and natural origins, arising from the activation of chemical, physical, and biological processes.

Pursuant to Article 199 of the Environmental Code of the Republic of Kazakhstan (2021), release of pollutants involves the release of harmful chemical components into the atmosphere from the following sources: structures; technological devices; technical equipment and installations; production sites; vehicles. These sources may be differentiated into static (fixed) and dynamic. Thus, stationary sources cannot be transported without dismantling and require, in general, a static position during operation. Note that emissions from a stationary source can be characterized as organized if there are special technological channels (gas ducts, ventilation pipes and shafts, deflectors) designed to ensure the direction of the flow of harmful chemical mixtures. Additional kinds of discharges from fixed sources in the form of diffuse flows are usually called fugitive (Environmental Code…, 2021).

In case of deterioration of the established air quality limits, confirmed by empirical data, the local government authority establishes more stringent standards for the permitted concentration of hazardous substances. It should be noted that the standards for industrial and sleeping areas of Kazakhstan are established within the framework of hygiene standards in force in national health care, which are not subject to regulation by the Environmental Code of the Republic of Kazakhstan (2021). In accordance with the norms of the Code, the state has determined the subsequent guidelines for allowable human-induced effects on the atmosphere:

- indicators of permitted emissions;
- technological indicators of emissions;
- indicators of permitted physical impacts.

Certainly, international legal standards are perpetually evolving and undergoing refinement. This dynamic necessitates that Central Asian countries remain vigilant in reshaping their domestic laws to manage and curtail the repercussions of harmful chemicals on the atmosphere (Colovic Daul et al., 2019). Concurrently, when integrating specific international regulations, it's vital to consider the unique facets of the political, economic, and cultural trajectories of Central Asian nations, as well as the region's scientific, technical, and industrial advancement status.

Importantly, examining the efforts of Central Asian countries to adopt international legal norms on air protection provides valuable insights into important criminological aspects of environmental law enforcement. Criminologists can contribute to the development of more effective ways to combat environmental crimes related to air pollution in the region by identifying problems, assessing compliance with international obligations and institutional capacity. An integrated and multifaceted approach is needed to ensure environmental justice, protect public health and achieve sustainable development goals in Central Asia and other regions (Aldrou et al., 2023).

Atmospheric protection organizations in Central Asia

It is imperative to note that the legislations of the countries of Central Asia, as proved above, have a certain similarity in the subject and object of legal regulation, which is determined both by their joint post-Soviet history and by the international legal obligations assumed by the states. It's worth highlighting that several international and regional organisations have been established, playing pivotal roles in ensuring the adherence to global and regional commitments for atmospheric protection. Thus, the Global Environment Facility was created and operates as an independent international financial entity, whose activities are implemented through the UNDP, UNEP, United Nations Industrial Development Program, UN Food and Agriculture Program, United Nations Institute for Training and Research, as well as such financial institutions as The World Bank, Asian Development Bank, African Development Bank, European Development Bank.

The Central Asian Regional Environmental Center (CAREC) was instituted in 2001, following a joint decision by Central Asian state leaders, along with representatives from the European Union and UNDP, with an aim to tackle air pollution. Specific initiatives targeting climate change adaptation are currently underway in Central Asian nations. It is worth noting that today the Climate Change and Sustainable Energy Program (CCSE) (2001) is in force, which is aimed at supporting climate change adaptation policies and the formation of sustainable energy, while implementing low-carbon development and promoting

climate change adaptation approaches. CAREC aims to become an information and methodological hub and analytical knowledge center on environmental issues for the Central Asian region, while continuing its active work as a recognized social entrepreneur.

Furthermore, the Central Asia Climate Information Platform (CACIP) serves as a regional hub for disseminating knowledge and facilitating discourse on climatic concerns. The platform encompasses five Central Asian nations: Kazakhstan, Kyrgyzstan, Turkmenistan, Tajikistan, and Uzbekistan. The goal is to facilitate the access, analysis and visualization of data to support and increase awareness, assessment and decision-making by citizens and governments. Consolidation of information obtained from global, regional and local sources enables efficient visualization and interpretation of air pollution data. Please note that the development of the information platform is funded by The World Bank (Climate Adaptation & Mitigation…, 2018). The project's objective is to mitigate the impacts of climate change in Central Asian countries through heightened information dissemination on climate change, coupled with enhanced investment and technical capabilities.

Particular attention in the implementation of projects related to ensuring air safety is paid by individual member states of Central Asia. Thus, a stable institutional structure has been created in Kyrgyzstan, with which the following international organizations closely interact: UNEP, UNDP, Ozone Center. In Kyrgyzstan, the Interdepartmental Ozone Coordination Commission operates at the national level, which includes: The Ministries of Health, Emergency Situations, Finance, Agriculture, Water Resources and Processing Industry, the Ministry of Economic Development and Trade, of Education and Science, the Government Office, State Customs Committee. The functions of the national executive body are assigned to the State Agency for Environmental Protection and Forestry (UNDP – Kyrgyzstan, 2023). In addition, in Kyrgyzstan, on the basis of a memorandum concluded between the Government of Kyrgyzstan represented by the Ministry of Ecology and Emergency Situations and UNEP, the Ozone Center was established and operates. The Center contributes to the fulfilment by the republic of the obligations stipulated by the Montreal Protocol on Substances that Deplete the Ozone Layer (1987) and the implementation of the Decree of the Government of the Kyrgyz Republic No. 263 “State program to stop the use of ozone-depleting substances” (2002).

Currently, UNDP in Kazakhstan is implementing the City Experimental Found (CEF) project to tackle the issue of atmospheric contamination in the city of Almaty (UNDP – Kazakhstan, 2023). In Europe and Central Asia, UNDP is introducing innovative technologies that can overcome the effects of air pollution

in certain regions. Accelerator the UNDP Lab is joining forces with local innovators in Almaty to create an Environmental Data Center that will collect and analyse air quality data. The Environmental Data Center collects data from satellite imagery, sensors and traffic flows using the latest technologies. The center consolidates the government, private business, international partners in order to solve problems related to air pollution. The Center provides citizens with the opportunity to share recommendations for improving air quality and the overall environmental situation in Kazakhstan using elements of gamification (UNDP – Kazakhstan, 2023). It should be noted that control over compliance with the indicators of permitted emissions from various sources is carried out through regular monitoring at designated evaluation sites specified in the environmental permit. Moreover, the Environmental Code of the Republic of Kazakhstan (2021) mandates an inventory of fixed sources of harmful substances, which is undertaken by the local executive authorities of regions and cities.

In Uzbekistan, UNDP first began operations in 1993 and over the following decades has implemented hundreds of projects with the national government, the business community, civil society and academia (UNDP – Uzbekistan, 2023). The UNDP division helps Uzbekistan adapt to climate change, protect the natural spaces of the republic, and provide technical and financial assistance in minimizing carbon emissions in the country. In order to control air quality in Uzbekistan, a service for monitoring environmental parameters has been organized (Reviews of environmental performance – Uzbekistan, 2020).

Turkmenistan has introduced standards for emissions of pollutants into the atmosphere, as well as sanctions for their violation. It should be noted that in order to control compliance with these provisions, environmental protection and environmental control services have been created that assess air quality in the Ministry of Agriculture and Environmental Protection of Turkmenistan. UNDP and the Global Environment Facility, together with the Ministry of Agriculture and Environmental Protection, are modernizing the monitoring systems for the ecological state of the city of Ashgabat. Under the purview of the "Sustainable cities in Turkmenistan: Integrated development of green cities in Ashgabat and Avaz" project (2018), specific equipment was set up to monitor atmospheric air quality for the Environmental Control Service of the Ministry of Agriculture and Environmental Protection. It's pertinent to highlight that such initiatives facilitate the drive to reduce greenhouse gas emissions by enhancing environmental oversight of industrial and production entities.

The study of the legal frameworks and obstacles arising from the implementation of air quality protection measures in Central Asian countries offers significant prospects for criminological understanding and prosecution of

environmental crimes. Despite some success in the adoption of international treaties and the development of national legislation, there are still discrepancies and gaps that hinder the successful deterrence and prosecution of air pollution offenses. Improving the precision of legal definitions, harmonizing regional strategies and promoting transboundary cooperation are essential measures to create a sustainable legal framework capable of effectively addressing environmental offences (Rasheva et al., 2019; Begzhan et al., 2021). In addition, it is crucial to strengthen enforcement mechanisms, raise public awareness and establish rigorous monitoring systems to detect violations and collect evidence for effective prosecution. In order to protect public health, preserve the environment and ensure sustainable development in the Central Asian region, it is necessary to adopt a comprehensive and coordinated strategy supported by a thorough criminological understanding of the factors, consequences and legal aspects related to air pollution offenses.

Conclusions

From the moment of gaining independence by the Central Asia states, a new stage of control over protected natural resources began in these countries. The present phase of progression of the national legislations of the states of Central Asia is characterized by a formed system of legal norms regulating a qualitatively homogeneous group of social relations related to the safeguarding of atmospheric air and the ozone layer. Nevertheless, one should recognize the extremely heterogeneous approach of the legislative bodies of the Central Asian region to the concentration of this system of norms in separate special legislative acts, or the incorporation of the system into a single codified law, which certainly affects the effectiveness and complexity of legal regulation.

The further ratification of international agreements, the modernization of domestic laws and international as well as regional collaboration are of particular importance for the states of Central Asia. It should be noted that this implementation is carried out both with the organizational, legal and financial participation of international organizations of partners and donors (UNEP, UNDP, The World Bank, Asian Development Bank, European Development Bank), and with the participation of organizations of the Central Asian region (CAREC, CACIP). It was these actions that allowed the states of Central Asia to become participants in the system of international relations for the saving of atmospheric air and the ozone layer. However, a pressing priority is the continued alignment of environmental laws within Central Asian countries, consistent with international legal accords, as emerging challenges in atmospheric protection necessitate efficient responses. Presently, sectors like energy, industry, and mining are the

primary contributors to air pollution from hazardous chemicals in Central Asian nations. Consequently, there's a need for technological advancements in these sectors to curtail detrimental atmospheric emissions.

An analysis from a criminological perspective on the legal disputes surrounding atmospheric pollution reveals a crucial focus: the necessity of harmonizing environmental laws in Central Asian countries with international legal norms. The alignment of legal measures is of utmost importance in effectively tackling the dynamic difficulties associated with air protection. The industries of industrial, energy, and mining are notable contributors to the release of hazardous chemicals, highlighting the urgent requirement for technological breakthroughs to effectively reduce these emissions. Examining international legal processes and domestic legislative reforms in Central Asia from a criminological perspective uncovers a promising environment for strengthening the legal efforts against environmental crimes. These criminal activities, which are based on the unlawful release of pollutants, present a significant risk to both public health and the environment. The key aspect of tackling these environmental transgressions involves the enhancement of legal definitions, the alignment of regional approaches, and the promotion of cross-border collaboration in order to establish a robust legal structure capable of effectively battling such offences.

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